Hoshizaki

Hoshizaki America, Inc.

Water Electrolyzer

Model
ROX-20TB2-U

"A Superior Degree of Reliability"

www.hoshizaki.com

SERVICE MANUAL

Number: X002-858
Issued: 3-9-2012

IMPORTANT

Only qualified service technicians should install, service, and maintain the unit. No service or maintenance should be undertaken until the technician has thoroughly read this Service Manual. Failure to service and maintain the equipment in accordance with this manual may adversely affect safety, performance, component life, and warranty coverage.

Hoshizaki provides this manual primarily to assist qualified service technicians in the maintenance and service of the unit.

Should the reader have any questions or concerns which have not been satisfactorily addressed, please call, write, or send an e-mail message to the Hoshizaki Technical Support Department for assistance.

HOSHIZAKI AMERICA, INC.
618 Highway 74 South
Peachtree City, GA 30269

Attn: Hoshizaki Technical Support Department

Phone: 1-800-233-1940 Technical Support
(770) 487-2331
Fax: 1-800-843-1056
(770) 487-3360
E-mail: techsupport@hoshizaki.com

Web Site: www.hoshizaki.com

NOTE: To expedite assistance, all correspondence/communication MUST include the following information:

- Model Number ______________________________
- Serial Number ______________________________
- Complete and detailed explanation of the problem.

IMPORTANT

This manual should be read carefully before the unit is serviced or maintenance operations are performed. Only qualified service technicians should install, service, and maintain the unit. Read the warnings contained in this booklet carefully as they give important information regarding safety. Please retain this booklet for any further reference that may be necessary.

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Important Safety Information

Throughout this manual, notices appear to bring your attention to situations which could result in death, serious injury, or damage to the unit.

⚠**WARNING**	**Indicates a hazardous situation which could result in death or serious injury.**
NOTICE	**Indicates a situation which could result in damage to the unit or property.**
IMPORTANT	**Indicates important information about the use and care of the unit.**

In the context of this manual, the term "sanitizing water" refers to acidic water and "cleaning water" refers to alkaline water.

⚠WARNING

This product should be destined only to the use for which it has been expressly conceived. Any other use should be considered improper and therefore dangerous. The manufacturer cannot be held responsible for injury or damage resulting from improper, incorrect, and unreasonable use.

To reduce the risk of death, electric shock, serious injury, or fire, follow basic precautions including the following:

- Only qualified service technicians should install and service the unit.
- This unit must be installed in accordance with applicable national, state, and local codes and regulations.
- This unit requires an independent power supply. See the nameplate for proper voltage and breaker/fuse size. Failure to use a proper breaker or fuse can result in a tripped breaker, blown fuses, or damage to existing wiring. This could lead to heat generation or fire.
- **THIS APPLIANCE MUST BE GROUNDED.** This appliance is equipped with a NEMA 5-15 three-prong grounding plug to reduce the risk of potential shock hazards. It must be plugged into a properly grounded, independent 3-prong wall outlet. If the outlet is a 2-prong outlet, it is your personal responsibility to have a qualified electrician replace it with a properly grounded, independent 3-prong wall outlet. Do not remove the ground prong from the power cord and do not use an adapter plug. Failure to follow these instructions may result in death, electric shock, or fire.
- Turn off the power supply before servicing. Lockout/Tagout to prevent the power supply from being turned back on inadvertently.
- Do not make any alterations to the unit. Alterations could result in electric shock, injury, fire, or damage to the unit.
- This unit is not intended for outdoor use (including under canopy). Exposure to rain may cause electric leak or shock. Direct sunlight can damage the plastic tank exterior, resulting in cracks and water leaks.

- Ensure adequate ventilation. Hydrogen gas or chlorine gas may cause health problems.
- Do not mix electrolyzed water with other chemicals. Mixture with acidic or chlorine-based chemicals can cause chlorine gas, resulting in health problems.
- Do not use a large volume of sanitizing water only. Generation of a large amount of chlorine gas may cause health problems or corrosion of surrounding equipment.
- Do not use a flame near a container or tank holding electrolyzed water. Hydrogen gas from cleaning water may cause ignition.

I. GENERAL INFORMATION

1. SAFETY INSTRUCTIONS

The following instructions contain important safety precautions and should be strictly observed.

⚠WARNING

1. When there is no need to energize the unit during disassembly or cleaning, be sure to unplug the unit or disconnect the main power supply before servicing the unit to prevent electric shocks.

2. If the unit must be energized for inspection of the electric circuit, use rubber gloves to avoid contact with any live parts, which may result in electric shocks.

3. Check for proper ground connections, and repair if necessary to prevent electric shocks.

4. Always use service parts intended for the applicable model for replacement of defective parts. Use proper tools to secure the wiring. Otherwise abnormal operation or trouble may occur and cause electric leaks or fire.

5. Check for proper part installations, wiring conditions and soldered or solderless terminal connections to avoid smoke, fire or electric shocks.

6. Be sure to replace damaged or deteriorated power cords and lead wires to prevent electric shocks, flames or smoke.

7. Lead wires using solderless terminals or the like must be bound with their closed ends up to avoid entrance of moisture that could lead to electric leaks or fire.

8. After servicing, always use a megohmmeter (500VDC) to check for the insulation resistance of minimum 1 megohm between the live part (attachment plug) and the dead metal part (ground terminal). Negligence in checking may cause electric leaks or shocks.

9. Do not service the electrical parts with wet hands to prevent electric leaks or shocks.

10. Always ask the user to keep children away from the work area. They may be injured by tools or disassembled products.

NOTICE

1. After servicing, be sure to check for water leaks from the water supply and drain lines to prevent wetting the surrounding properties.

2. After servicing, always check for proper operation.

CAUTION LABEL LOCATIONS

The following caution labels are attached where special care should be taken.

On top panel

⚠ CAUTION	⚠ ATTENTION
DO NOT DRINK ELECTROLYZED WATER. USE FOR OTHER THAN WASHING PURPOSE MAY CAUSE HARM TO THE HEALTH.	NE PAS BOIRE L'EAU D'ÉLECTROLYSE. TOUTE UTILISATION DANS UN BUT AUTRE QUE LE NETTOYAGE SERAIT SUSCEPTIBLE D'ENTRAÎNER DES RISQUES POUR LA SANTÉ.

IMPORTANT

- Use only sodium chloride (NaCl) or potassium chloride (KCl) of at least 99% purity. Any other kind of salt may cause mechanical failures, clogged pipes, or harm to the health.
- Check for loose screws.To avoid water leaks, do not loosen the screws.
- Utiliser uniquement du chlorure de sodium (NaCl) ou du chlorure de potassium (KCl) pur à au moins 99%. Tout autre type de sel risquerait de provoquer des dysfonctionnements mécaniques, de boucher les tuyaux ou d'entraîner des risques pour la santé.
- Rechercher d'éventuelles vis desserrées. Afin d'éviter les fuites d'eau, ne pas desserrer les vis.

476026L01A

⚠ CAUTION	⚠ ATTENTION
DO NOT DRINK ELECTROLYZED WATER OR ALLOW CONTACT IN EYES OR FACE. RINSE WITH PLENTY OF TAP WATER IF ELECTROLYTIC WATER GETS INTO EYES OR FACE.	NE PAS BOIRE L'EAU D'ÉLECTROLYSE NI LA LAISSER ENTRER EN CONTACT AVEC LE VISAGE OU LES YEUX. EN CAS DE CONTACT DE L'EAU D'ÉLECTROLYSE AVEC LE VISAGE OU LES YEUX, RINCER ABONDAMMENT À L'EAU DU ROBINET. 476027L01A

Inside door



⚠ CAUTION	⚠ ATTENTION
RISK OF ELECTRIC SHOCK. DISCONNECT POWER BEFORE SERVICING UNIT.	RISQUE D'ÉLECTROCUTION. DÉBRANCHER DE L'ALIMENTATION ÉLECTRIQUE AVANT TOUTE OPÉRATION D'ENTRETIEN SUR LA MACHINE. 476028L01A

2. PRODUCT INFORMATION

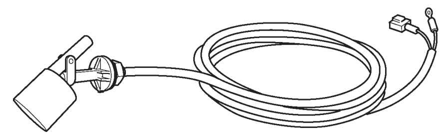
[a] FEATURES

1) Space saving

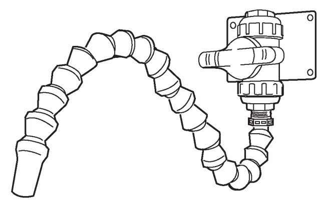
The compact unit [W11" x D16" x H12" (W280 x D400 x H310 mm)] allows for installation under sink.

2) Various optional parts available

Float switch: Detects the tank water level to automatically start/stop operation. Includes the upper and lower sanitizing water tank level float switches and upper and lower cleaning water tank level float switches.



Outlet valve: Allows use of electrolyzed water stored in the tank, as required. Connected with the electrolyzed water outlets [for sanitizing and cleaning water outlets] on the water tank. Use as needed [yellow for sanitizing water, blue for cleaning water].



3) Concentrated salt water direct injection system

Direct addition of concentrated salt water held in the salt water tank (accessory) into the water flow requires no tank for diluted salt water, resulting in reducing the space required.

4) Built-in current sensor

No salt concentration sensor is required. The built-in current sensor provides highly accurate control.

5) Constant-voltage DC power supply

Current control by a constant-voltage power supply uses the salt concentration to correct reduction of the electrolyzation efficiency, resulting in stable concentration of available chlorine.

6) Available chlorine concentration 20 - 30 mg/L or more

Sanitizing water contains undissociated hypochlorous acid (HOCl) which sanitizes faster than sodium hypochlorite (NaOCl) and does not leave residue.

7) Built-in flow rate adjusting valve

The built-in flow rate adjusting valve automatically controls the flow rate according to the selection (low, medium, high).

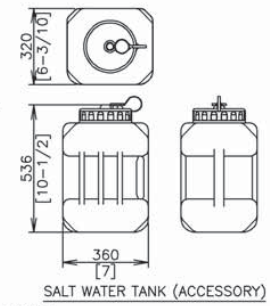
[b] MODEL NAME

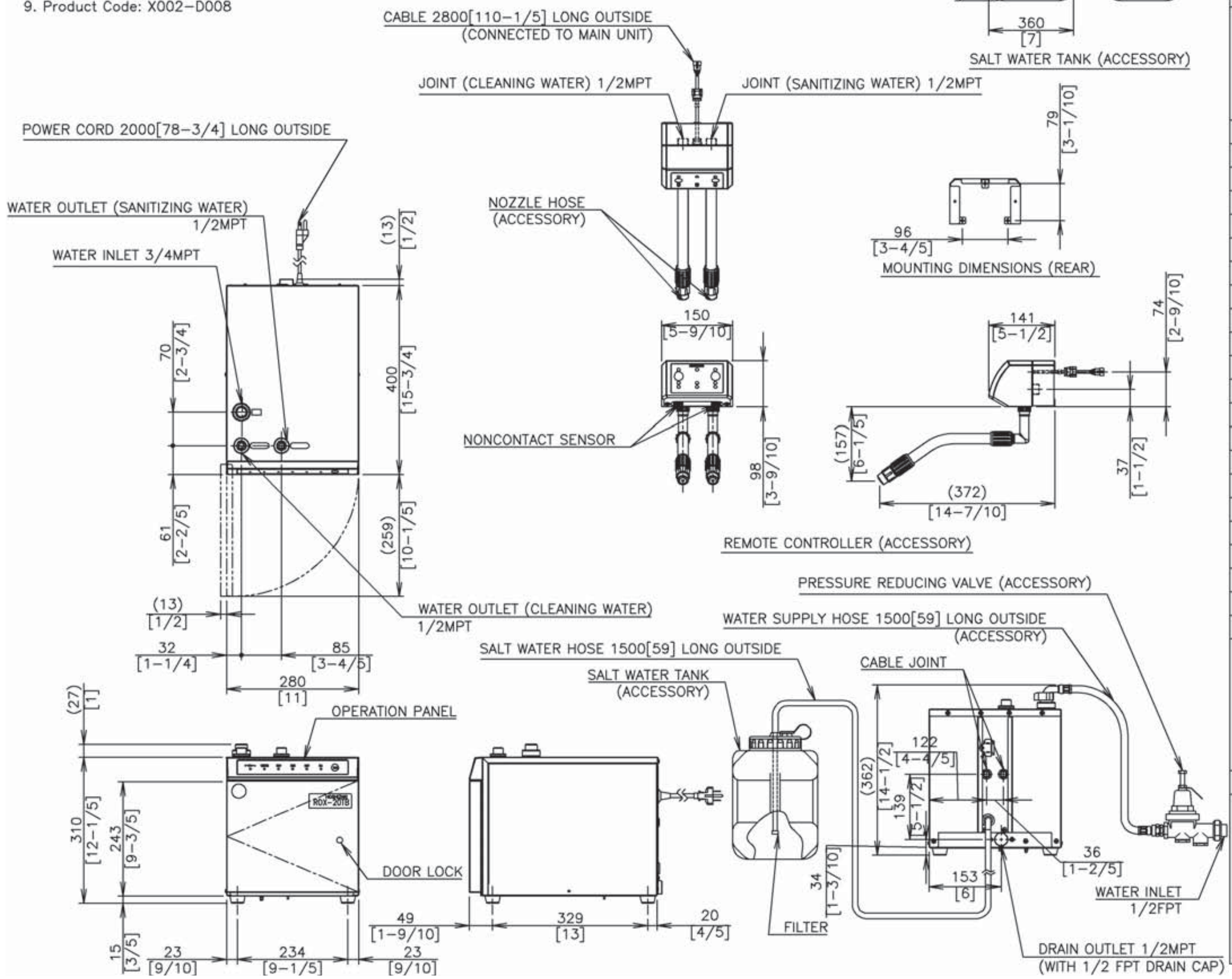
ROX - 20 T B2 - U

- U: For USA
- B2: Development order
- T: Table-top or under-sink installation
- 20: Maximum flow rate (x 0.1 L/min)
- ROX: Hoshizaki water electrolyzer

3. DIMENSIONS/SPECIFICATIONS

1. Proper grounding is required.
2. The installation site must be clean, dust-free and well ventilated.
3. The external piping must be insulated to prevent condensation.
4. The external piping must have equivalent resistance.
5. The rated properties are based on measurements at ambient temperature 30℃(86° F), water temperature 25℃(77° F), electrolytic voltage 12V, electrolytic current 10A and production rate 2 L/min(0.26 gal/min), by using Peachtree City water.
6. The minimum water supply pressure of 0.15 MPa(22 PSIG) will be required for selection of the "High" production rate.
7. Install the product properly in accordance with the instructions on location, water supply/drain connections and electrical connections stated in the instruction and installation manuals provided. Allow 10mm[0.4] extra space at the installation site to meet any installation requirements (additional spacing is also required for proper water connections).
8. Dimensions in [ ] are in inches.
9. Product Code: X002-D008

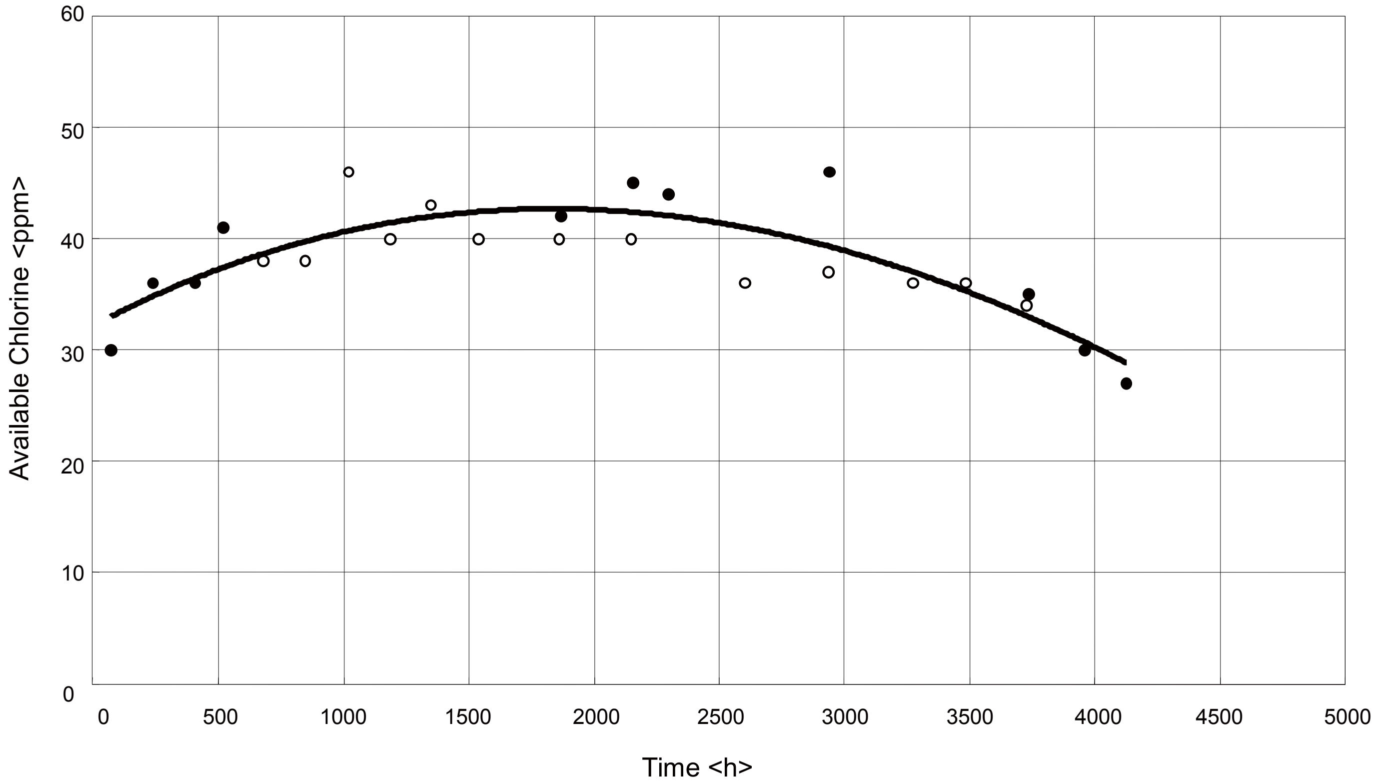




ITEM			
MODEL		ROX-20TB2-U	
POWER SUPPLY		1 Phase 115V 60Hz	
AMPERAGE		3.0A	
ELECTRIC CONSUMPTION		170W	
STANDARD PERFORMANCE	PRODUCTION RATE	Sanitizing/Cleaning Water: 2.0 L/min(0.52 gal/min)	
	AVAILABLE CHLORINE	Sanitizing Water: 20 mg/kg or more(0.17 lbs x 10^3/gal or more)	
	pH	Sanitizing Water: Approx. 3 or less, Cleaning Water: Approx. 11 or more [Note] Water Temp 25° C(75° F), Electrolytic Voltage 12V, Electrolytic Current 10A (Peachtree City Water)	
REFERENCE PERFORMANCE	PRODUCTION RATE	Sanitizing/Cleaning Water: Approx. 1.5 – 3.0 L/min(0.4 – 0.8 gal/min) (Min. water supply pressure of 0.15 MPa(22 PSIG) required to ensure 2.0 – 3.0 L/min(0.52 – 0.8 gal/min))	
	AVAILABLE CHLORINE	Sanitizing Water: Min. 10^3mg/kg(0.09 lbs x 10/gal) (Production Rate: Approx. 3 L/min(0.8 gal/min))	
	pH	Sanitizing Water: Approx. 2.9 – 3.3, Cleaning Water: Approx. 10.5 – 11.0 [Note] Depends on raw water quality and temperature	
OUTSIDE DIMENSIONS		280mm[11](W) x 400mm[15-3/4](D) x 310mm[12-3/16](H)	
EXTERIOR		Stainless Steel, Galvanized Steel (Polyester Powder Paint), ABS Plastic	
INTERIOR		Stainless Steel, Galvanized Steel (Polyester Powder Paint)	
ELECTROLYSIS SYSTEM		Membrane Technology	
DILUTE SALT WATER ADJUSTMENT SYSTEM		Direct Electromagnetic Pump Injection Method	
ELECTROLYTIC CURRENT ADJUSTMENT SYSTEM		Automatic Adjustment (with Water Temp Correction)	
ELECTROLYTIC VOLTAGE ADJUSTMENT SYSTEM		Automatic Adjustment	
PRODUCTION RATE ADJUSTMENT SYSTEM		Automatic Adjustment by Switch Operation (Low/Standard/High)	
WATER SUPPLY SYSTEM		Direct Connection to Water Main (Accessory pressure reducing valve required) G3/4 (G1/2)	
START/STOP		Push Button Switch, Noncontact Sensor	
DISPLAY		Operation, Ready, Add Salt Water, Flush, Replace Cell, Error	
CONNECTIONS		Water Inlet G3/4 (Pressure Reducing Valve G1/2), Water Outlet G1/2, Drain Outlet G1/2	
CELL POLARITY SWITCHING CONTROL		Timer-Programmable Controller (Protection for power failure)	Microprocessor Controlled
CELL POWER SUPPLY		Constant Voltage DC Power Supply (300W)	
CELL REPLACEMENT TIME		Timer-Programmable Controller (Protection for power failure)	
SALT WATER USAGE CONTROL		Electrode Level Sensor	
DILUTE SALT WATER CONCENTRATION		Automatic Adjustment by Electrolytic Voltage and Current	
ELECTRIC CIRCUIT PROTECTION		Earth Leakage Circuit Breaker (with Overcurrent Protector), Earth Wire, Fuse (for PC Board: 5A)	
SAFETY DEVICE PROTECTION		Emergency Stop by Microprocessor Control	
WEIGHT		Approx. 22 kg(44 lbs) (Gross 28 kg(53 lbs))	
PACKAGE		Carton 380mm[14-15/16](W) x 480mm[18-7/8](D) x 550mm[21-5/8](H)	
CERTIFICATION		ETL, NSF	
ACCESSORIES		Salt Water Tank (5 L(1.32 gal)), Cap (x 2), Connection Hose Assy, Hose Clamp, pH Tester (TB, AZY), Chlorine Tester, Measuring Cup, Gasket, Pressure Reducing Valve (0.15MPa(22 PSIG)), Operation Sheet, Braided Hose, Remote Controller Union – Elbow, Rubber Dropper, Elbow	
OPTION		Float Switch	
INSTALLATION CONDITIONS		Ambient Temp: 5 – 35℃(40 – 95° F) Water Temp: 5 – 30℃(40 – 86° F) Relative Humidity: Max. 85% (No condensation) Water Supply Pressure: 0.10 – 0.75 MPa(22 – 109 PSIG) Voltage Range: Rated Voltage±10% Installation Site: Indoor, Ventilation required Water Supply: Comply with local water and sewerage requirements, Water Softener and Filter required Salt: Min. Purity 99%	

4. PERFORMANCE DATA

The following graph shows the electrode performance curve. The electrode life cycle depends on the free chlorine concentration as well as the raw water quality. To optimize the electrolyzed water, we recommend the electrolytic cell should be replaced every 3,000 hours of operation.



II. TECHNICAL INFORMATION

1. PRINCIPLE OF ELECTROLYSIS

Water (H_2O) we use in our daily life has a mysterious power. Adding a small amount of salt (NaCl) to water (H_2O) and electrolyzing it with special electrodes will generate "electrolytic oxidizing water (acidic water)" with strong oxidizing effects and "electrolytic reducing water (alkaline water)" with strong reducing effects. Here we explain this electrolysis process and the meaning of such terms as "pH" and "oxidization/reduction" which may sound unfamiliar.

Electrolysis Process - See the diagram on the following page for the electrolysis mechanism inside the electrolytic cell.

1) Electrolysis with a higher salt concentration around 5 - 20% is apt to generate chlorine gas (Cl_2) at the anode. The electrolyzer with a lower salt concentration around 0.07 - 0.15% is apt to generate hypochlorous acid (HOCl) at the anode.
2) At the anode, oxidization will generate hypochlorous acid (HOCl) and chlorine gas (Cl_2).
3) At the cathode, reduction will generate hydrogen gas (H_2) and sodium hydroxide (NaOH).

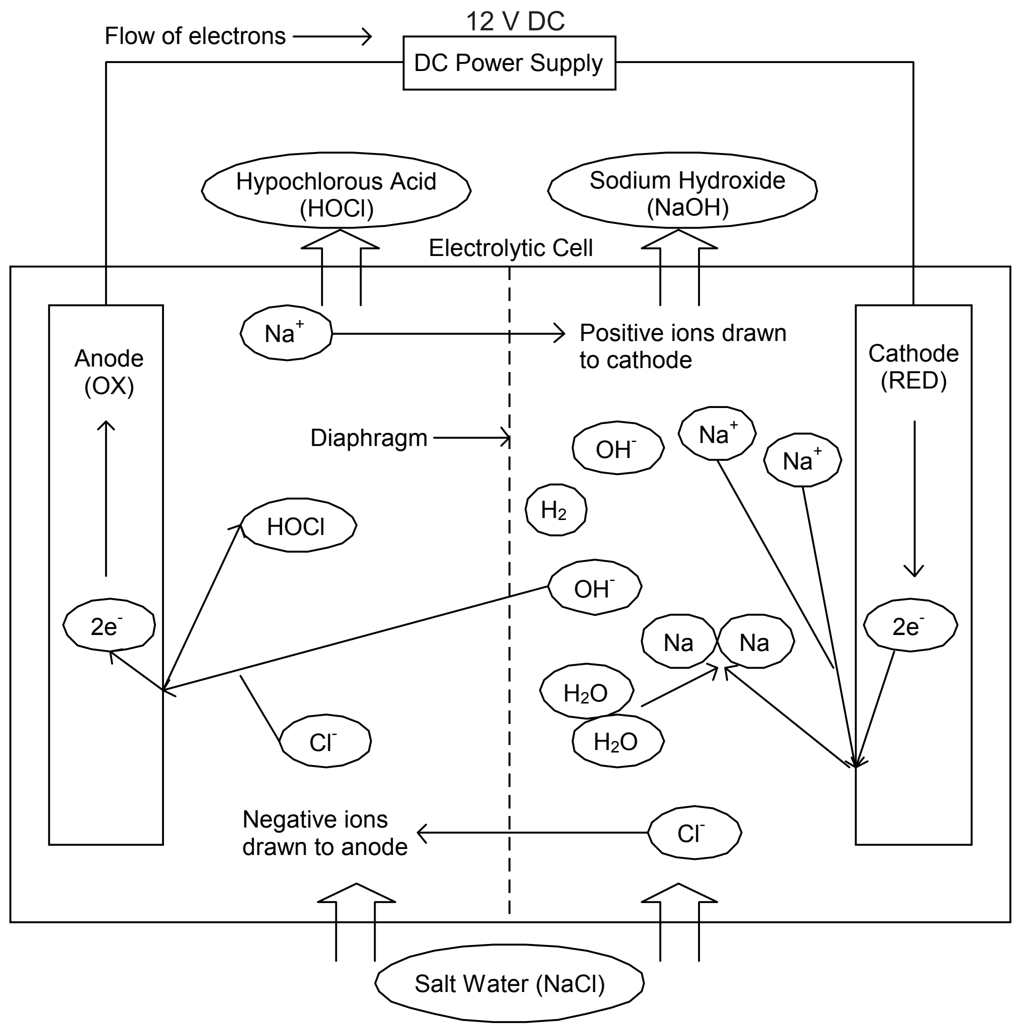
Oxidization/Reduction - Oxidization and reduction occur a the same time, while electrons are transferred.

1) Oxidization - Reaction of a substance to emit electrons.
2) Reduction - Reaction of a substance to receive electrons.

Oxidization/Reduction Potential - Degree of liability to oxidization and reduction, indicated in "mV".

1) Positive potential - An oxidizing agent (= a substance capable of oxidizing other substances) is contained. The higher potential shows the higher tendency to oxidize other substances.
2) Negative potential - An reducing agent (= a substance capable of reducing other substances) is contained. The lower potential shows the higher tendency to reduce other substances.

pH - Concentration index of hydrogen ions. pH7 means neutrality, the higher pH alkalinity, and the lower pH acidity.



Reactions at Anode

Chloride ions (Cl^-) and hydroxide ions emit electrons (e^-) to the anode, which become hypochlorous acid (HOCl).

Reactions at Cathode

Sodium ions (Na^+) receive electrons (e^-) from the cathode and become sodium metal (Na) which reacts with water (H_2O) and becomes sodium hydroxide (NaOH) and hydrogen gas (H_2).

Salt water contains four kinds of ions; sodium ions (Na^+), chlorine ions (Cl^-), hydrogen ions (H^+) and hydroxide ions (OH^-).

$NaCl + H_2O \rightarrow Na^+ + Cl^- + H^+ + OH^-$
(Mix water and salt) Salt water (4 kinds of ions)

When two electrodes are inserted into salt water and voltage is applied:

Negative ions (Cl^-) are drawn to the anode, and
Positive ions (Na^+) are drawn to the cathode.

At the anode, hydrogen chloride (HCl) and hypochlorous acid (HOCl) are generated.

$2Cl^- + H_2O \rightarrow HCl + HOCl + 2e^-$

Electrons ($2e^-$) are emitted to the anode, which means the acidic water (HCl + HOCl) causes
oxidization. [As electrons are emitted, the oxidization/reduction potential becomes positive (+mV).]
Chlorine ions also emit electrons and become chlorine gas (Cl_2).

$2Cl^- \rightarrow Cl_2 + 2e^-$
(Cl_2 = chlorine gas)

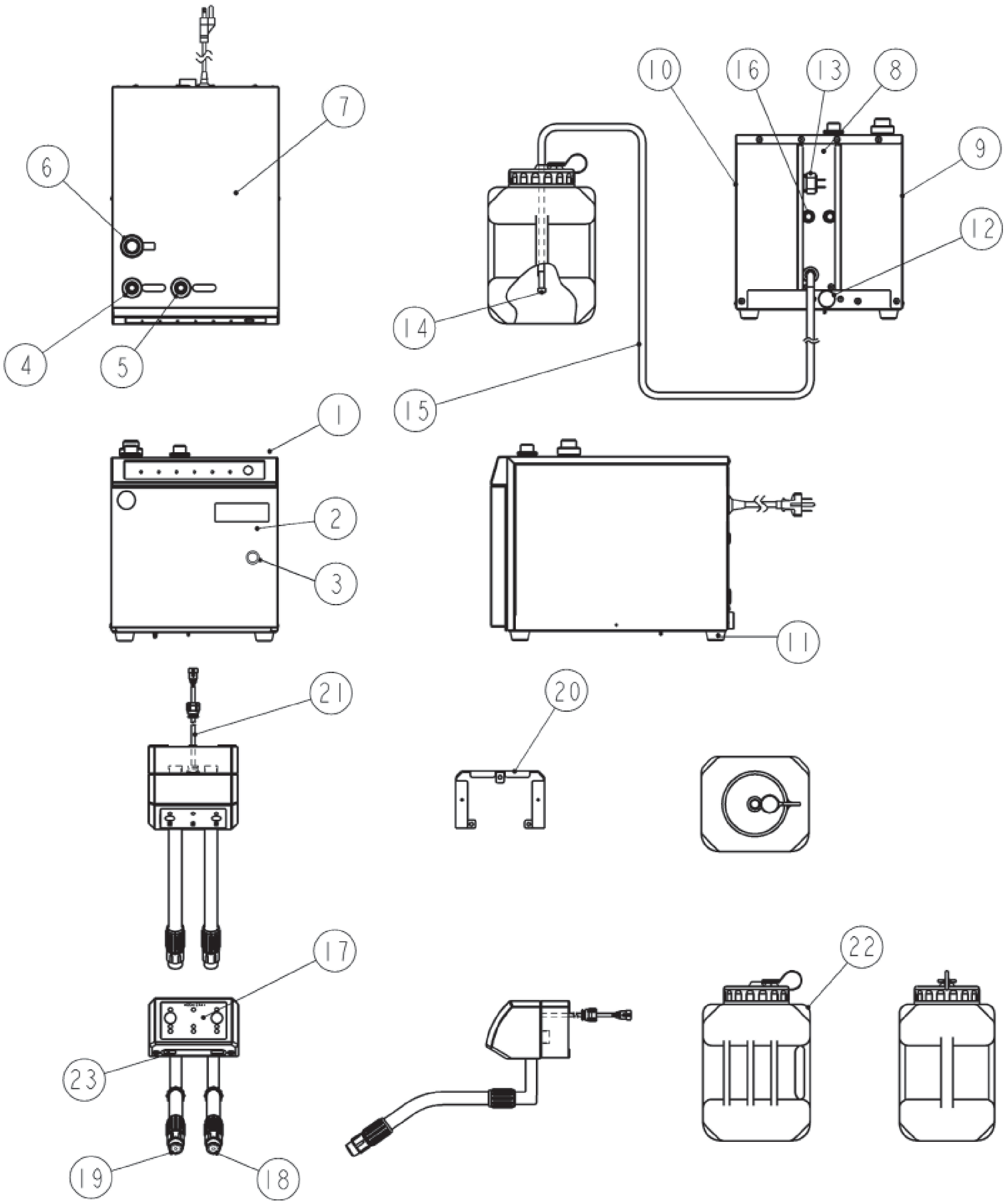
At the cathode, sodium hydroxide (NaOH) and hydrogen gas (H_2) are generated.

$Na^+ + H_2O + H^+ + 2e^- \rightarrow NaOH + H_2$

Electrons ($2e^-$) are received from the cathode, which means the alkali water (NaOH) causes reduction. [As electrons are received, the oxidization/reduction potential becomes negative (-mV).]

2. CONSTRUCTION

[a] GENERAL



(1) Operation Panel [Body]

Displays the present state of the electrolyzer.

(2) Door

Provided behind are the power switch (ground fault interrupter) and the buttons to adjust the operating conditions and various set values.

(3) Coin Lock
Locks the door.

(4) Cleaning Water Outlet
Dispenses cleaning water (sanitizing water in flushing process). Should be connected with the cleaning water outlet [remote].

(5) Sanitizing Water Outlet
Dispenses sanitizing water (cleaning water in flushing process). Should be connected with the sanitizing water outlet [remote].

(6) Water Supply Inlet
Should be connected with the water supply hose (G3/4) provided.

(7) Panel
Only a responsible maintainer or service personnel may open.

(8) Rear Panel
Only a responsible maintainer or service personnel may open for connection of the remote controller cable.

(9) Panel (L)
Only a responsible maintainer or service personnel may open.

(10) Panel (R)
Only a responsible maintainer or service personnel may open for connection of the remote controller cable.

(11) Leg
Do not remove. Not adjustable. Use spacers, if required, for stable installation.

(12) Drain Outlet
Can be connected with a drain pipe (G1/2), if the internal water circuit should be drained.

(13) Power Cord
Single phase 115V. Be careful not to jerk or pinch.

(14) Salt Water Filter
Removes foreign matter from concentrated salt water in the salt water tank. Do not clog. Clean at least once a month.

(15) Salt Water Hose
Supplies concentrated salt water from the salt water tank. Do not curve or bend by force.

(16) Remote Controller Receptacle
Connects the remote controller cable with the electrolyzer body. Remove the grommet, and attach the super lock of the remote controller.

(17) Operation Panel [Remote]
For the remote controller. Attachable at a point of use.

(18) Cleaning Water Outlet [Remote]
Should be connected with the cleaning water outlet to dispense cleaning water (sanitizing water in flushing process).

(19) Sanitizing Water Outlet [Remote]
Should be connected with the sanitizing water outlet to dispense sanitizing water (cleaning water in flushing process).

(20) Controller Bracket
Fixes the remote controller. Secure on a wall with anchor bolts.

(21) Cable

Electrically connects the remote controller and the electrolyzer body. Be sure to make the connection when using the remote controller.

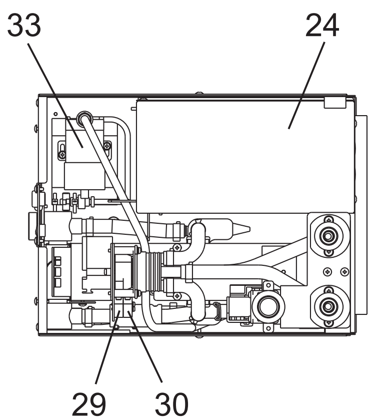
(22) Salt Water Tank

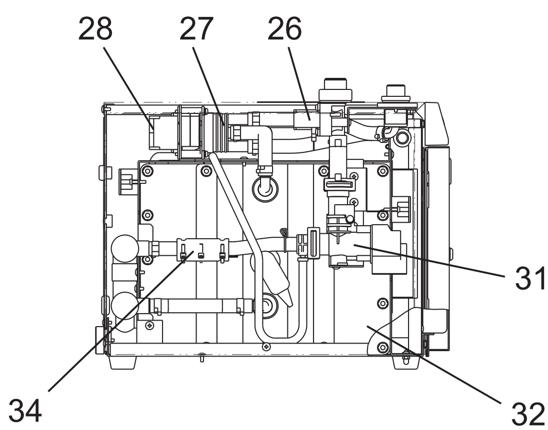
Makes 1.32 gal (5 L) of electrolyte (concentrated salt water) and adds it to water (diluted salt water).

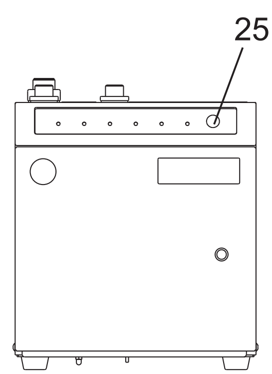
(23) Motion Sensor

Non-contact sensor to start and stop dispensing electrolyzed water.

[b] MECHANISM







(24) Control Box

Functions as the brain of the electrolyzer to control its operation

(25) Dispense Button [Body]

Starts and stops dispensing sanitizing water and cleaning water.

(26) Water Valve

Supplies water from the water supply hose to the electrolytic cell.

(27) Flow Switching Valve

Operates every 12 hours to change the flow direction when the DC voltage to the electrolytic cell reverses.

(28) Gear Motor

Rotates the impeller inside the flow switching valve.

(29) Microswitch [Location]
Senses the location of the flow switching valve.

(30) Microswitch [Direction]
Senses the direction of the flow switching valve.

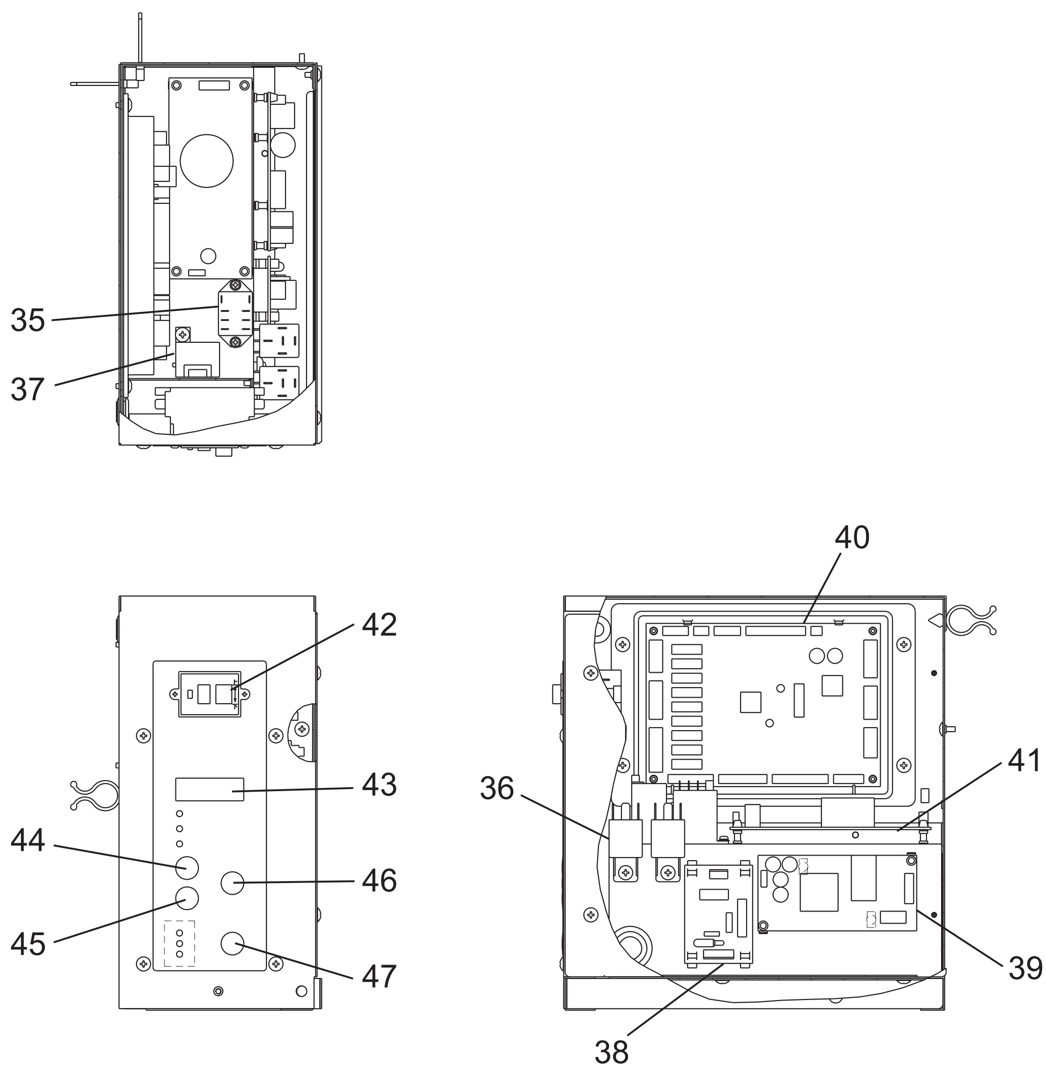
(31) Flow Control Valve
Located between the water supply inlet and the electrolytic cell. Adjusts the rate of water supply.

(32) Electrolytic Cell
Electrolyzes diluted salt water to generate sanitizing water and cleaning water.

(33) Salt Water Pump (Electromagnetic Pump)
Feeds a fixed amount of concentrated salt water (electrolyte) into the electrolytic cell.

(34) Thermistor
Senses the water temperature and automatically reduces the electrolytic current to prevent excessive available chlorine concentration in low temperature conditions.

[c] CONTROL BOX



(35) Relay (X1)
  Located on the supply line of the switching regulator [electrolytic cell]. Turns on/off the switching regulator by using a make contact.

(36) CB Relay
  Changes the polarity of the voltage on the electrolytic cell.

(37) Current Sensor
  Measures the current of the electrolytic cell.

(38) Noise Absorber
  Noise absorbing board provided with a surge absorber.

(39) Switching Regulator [Main Control Board]
  DC power supply to drive the DC electrical components.

(40) Main Control Board
  Functions as the brain of the controls to verify inputs and command outputs.

(41) Switching Regulator [Electrolytic Cell]
  DC power supply for electrolysis in the electrolytic cell.

(42) Power Switch (Ground Fault Interrupter)
  Shuts off the primary power supply in case of ground leakage or overcurrent.

(43) Display
  Displays the cell run time (h) normally and the present conditions of the electrolyzer by switch operation.

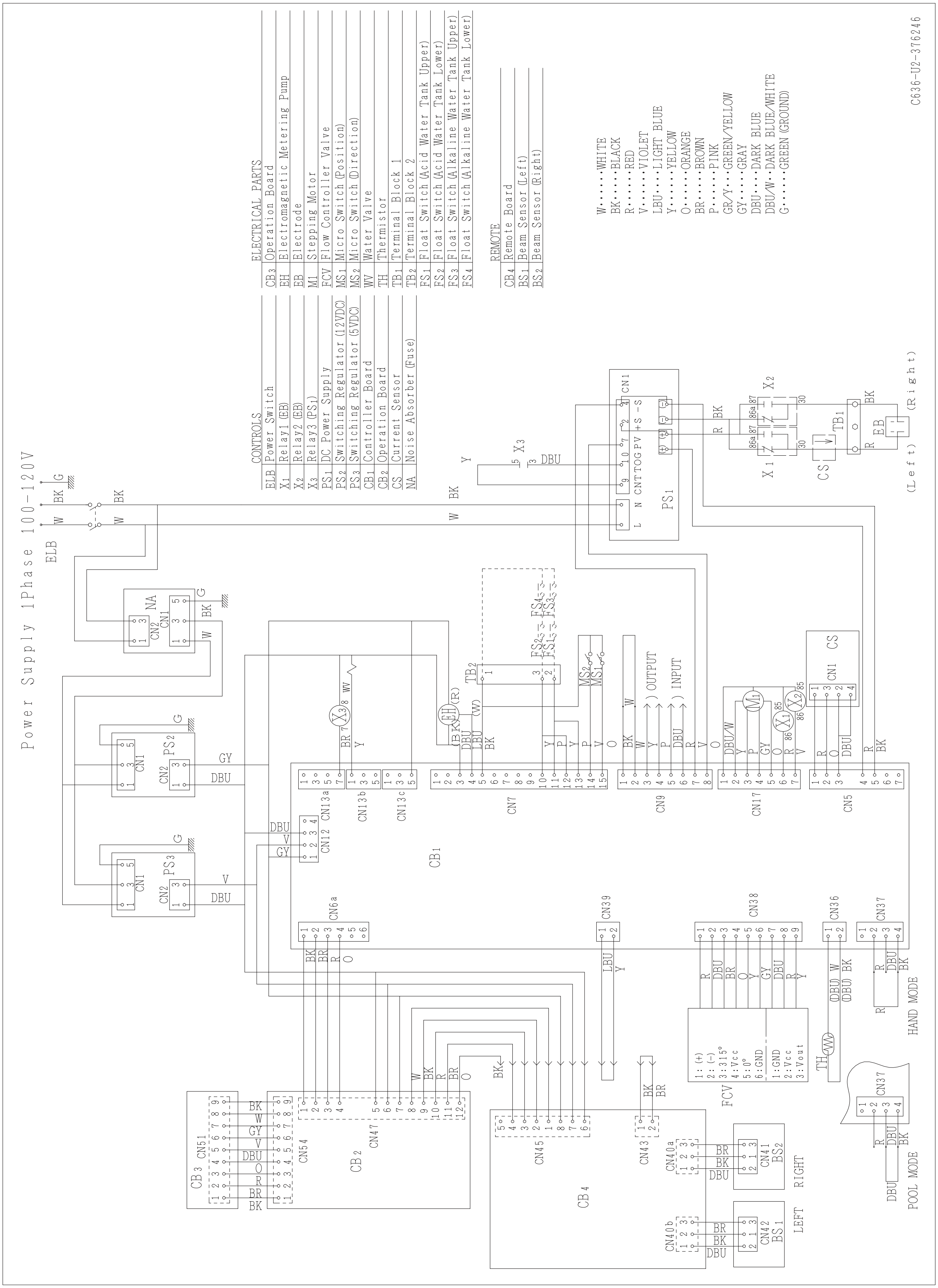
(44) Display Select Button
  In the normal mode, selects the display indication between the cell run time, current, and voltage.

(45) Flush Button
  In the normal mode, operates the flow changing valve to flush the water circuit.

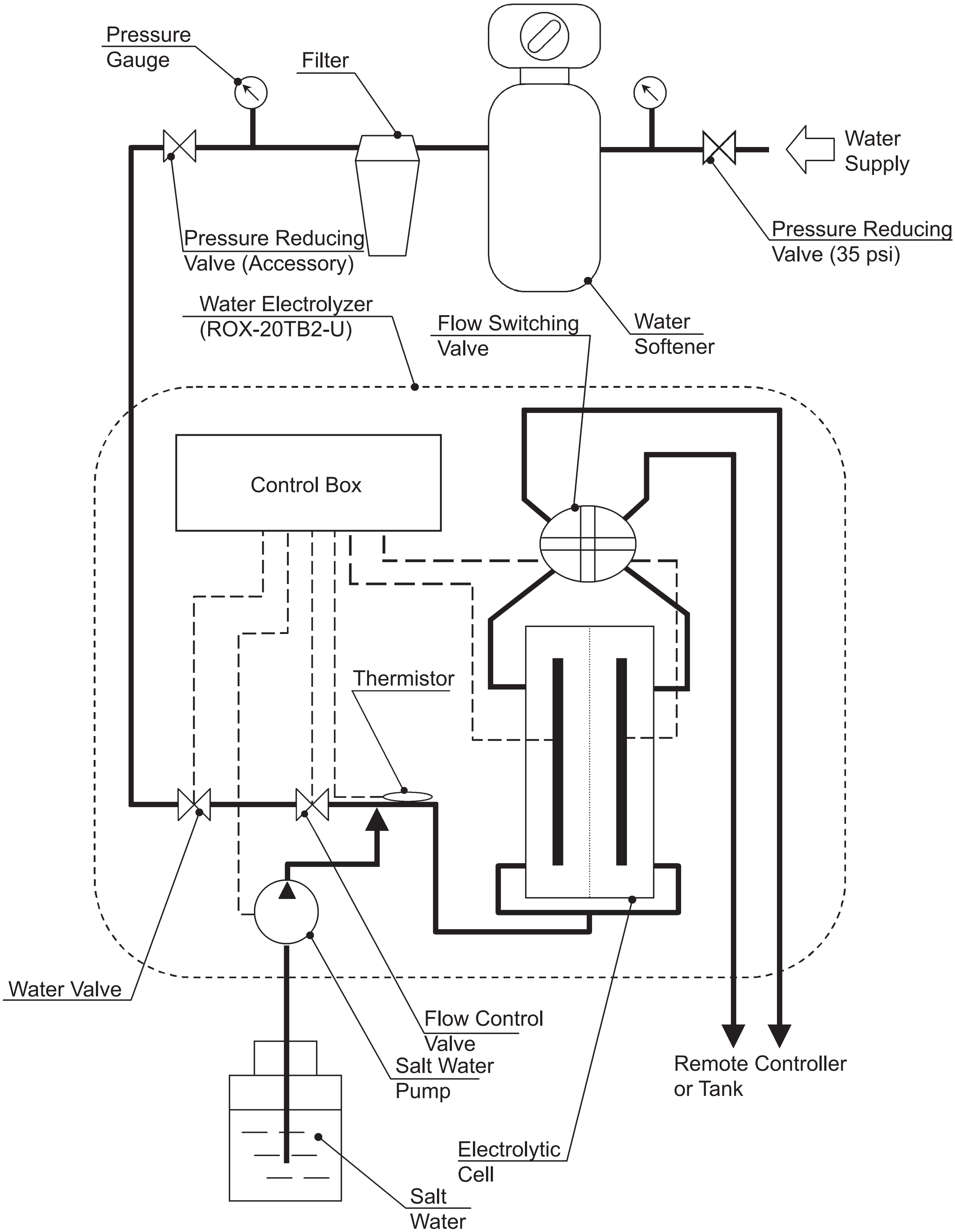
(46) Set/Reset Button
  Adjusts various set values.

(47) Flow Rate Select Button
  Adjusts the flow rate.

3. WIRING DIAGRAM



4. WATER CIRCUIT



5. FUNCTIONS AND OPERATION

[a] NORMAL MODE

The following menus are available in the normal mode. The display shows from 1 to 3 every time the display select button is pressed.

No.	Menu	Description
1	Cell run time (h)	Total electrolytic cell run time at present.
2	Current (A)	Current flowing in electrolytic cell at present as measured by current sensor.
3	Voltage (V)	Voltage provided on electrolytic cell at present as measured by main control board.

[b] SHORT MODE

Use this mode to change the polarity every 2 minutes.

1) While the power switch (ground fault interrupter) is off, hold down the flush button and set/reset button.
2) Turn on the power switch (ground fault interrupter).
3) After 5 seconds, release the flush button and set/reset button.

Note: The operation lamp flashes while the short mode is selected.

[c] ADJUSTMENT MODE

The following menus are available in the adjustment mode.

No.	Menu	Factory default	Adjustable range/increments
A1	Current (A)	Lo: 10, Std: 10, Hi: 10	5.0 to 18.0/0.1 [wt=77°F(25°C)]
A2	Voltage (V)	Lo: 12, Std: 12, Hi: 12	7.0 to 18.0/0.1
A3	Total flow rate (L/min)	Lo: 3.0, Std: 4.0, Hi: 6.0	1.5 to 8.0/0.1
A4	Combination	1	Main: 1, Sub: 2
A5	Portion control time (min)	1	1 to 60/1
A6	Cleaning water dispensing time for hand washing (s)	30	15 to 120/5
A7	Sanitizing water dispensing time for hand washing (s)	30	15 to 120/5
A8	Cell run time/reversal time reset	N/A	Display present run time, then hold down set/reset button (10s) to reset
A9	Initial flash time (s)	Std	Std, 0 to 20/1

No.	Menu	Factory default	Adjustable range/increments
A10	Cell replacement time (h)	3000	1500 to 9000/100
A11	Cell reversal time (h)	12	0.033 (check), 1 to 150/1
A12	Continuous dispensing protection time (min)	Cont	Cont, 10 to 720/10
A13	Single nozzle	2	Single: 1, Std: 2
A14	Water temperature correction factor	4	0 to 8/1
A15	Flow rate adjustment factor, operation time factor	0.3	0.1 to 2.0/0.1
A16	Skip	N/A	Skip
A17	Flow rate correction value (L/min)	0	-0.5 to 0.5/0.1
A18	Water softener regeneration output cycle (h)	0	0 to 100/1
A19	Salt water supply factor, feedback	1.0	1.0 to 5.0/0.1
A22	Salt water supply factor, initial non-electrolysis time (s)	5	1 to 10/1
A23	Salt water supply factor, feedback cycle	1.0	1.0 to 5.0/0.1
A25	Salt water supply factor, stroke subtraction after reaching set point (times/s)	N/A	Skip
A26	Reset	N/A	Display "rSEt", then hold down set/reset button (10s) to reset
A27	Flow control valve open/closed	N/A	Display current status

* Basically do NOT adjust the menus in gray.

[d] CHECK MODE

The following menus are available in the check mode.

No.	Menu
C1	Inputs
C2	Inputs
C3	Outputs
C4	Salt water pump stroke (spm: strokes per minute)
C5	Total flow rate (L/min)
C6	Water temperature (°C)
C7	Set current at present water temperature (A)
C8	Corrected current (A)
C9	Elapsed cell reversal time (min)

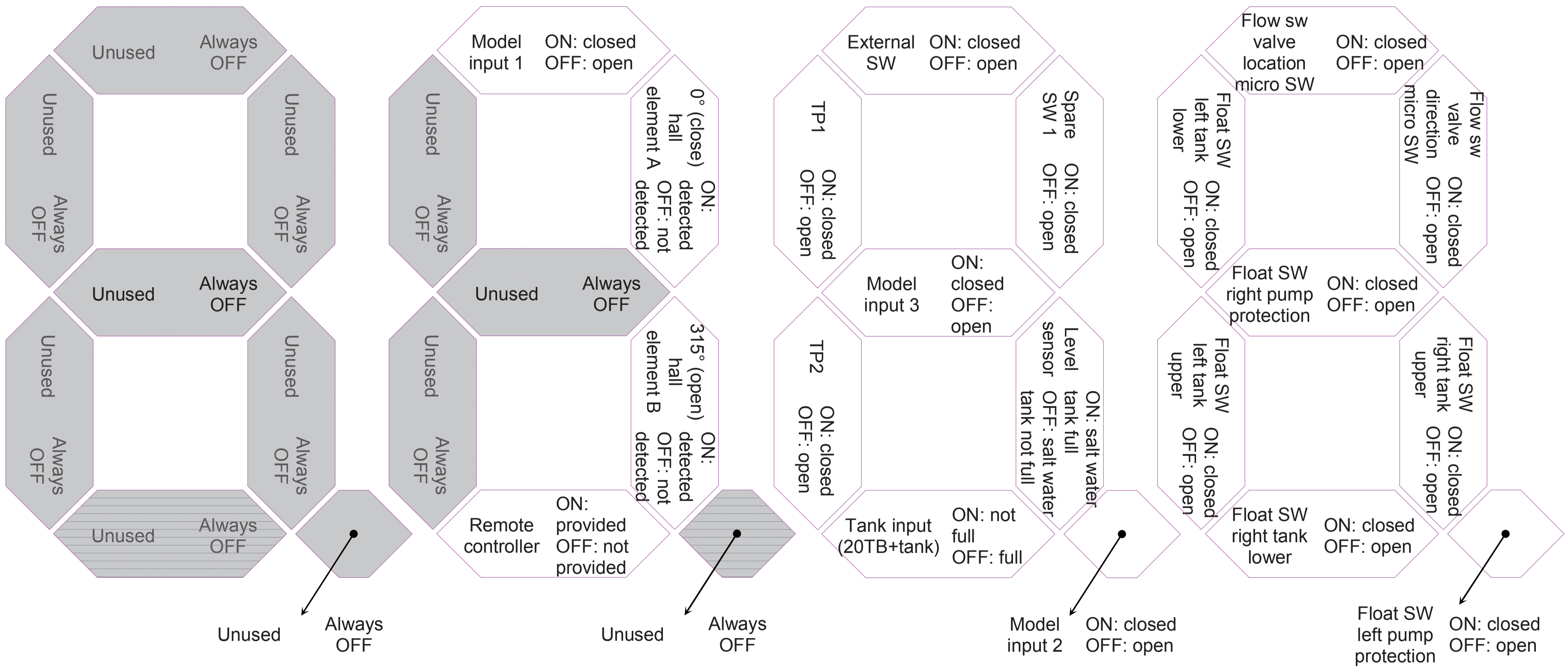
No.	Menu
C10	Elapsed time after regeneration output (h)
C11	Last error number
C12	Cell run time at last error
C13	Cell reversal time at last error
C14	Current at last error
C15	Voltage at last error
C16	Total flow rate at last error
C17	Salt water pump stroke at last error (spm: strokes per minute)
C18	Water temperature at last error (°C)
C19	Set current at water temperature at last error (A)
C20	Corrected current at last error (A)
C21	Second from last error number
C22	Cell run time at second from last error
C23	Cell reversal time at second from last error
C24	Current at second from last error
C25	Voltage at second from last error
C26	Total flow rate at second from last error
C27	Salt water pump stroke at second from last error (spm: strokes per minute)
C28	Water temperature at second from last error (°C)
C29	Set current at water temperature at second from last error (A)
C30	Corrected current at second from last error (A)
C31	Third from last error number
C32	Cell run time at third from last error
C33	Cell reversal time at third from last error
C34	Current at third from last error
C35	Voltage at third from last error
C36	Total flow rate at third from last error
C37	Salt water pump stroke at third from last error (spm: strokes per minute)
C38	Water temperature at third from last error (°C)
C39	Set current at water temperature at third from last error (A)
C40	Corrected current at third from last error (A)
C41	Model configuration (8: ROX-20TB2-U, 10: ROX-20TB2-U with tank)
C42	Control board version

* Fahrenheit and celusius conversion formulae:

$$°C = (°F - 32) \times 5/9$$

$$°F = (9/5) \times °C + 32$$

C1 Display



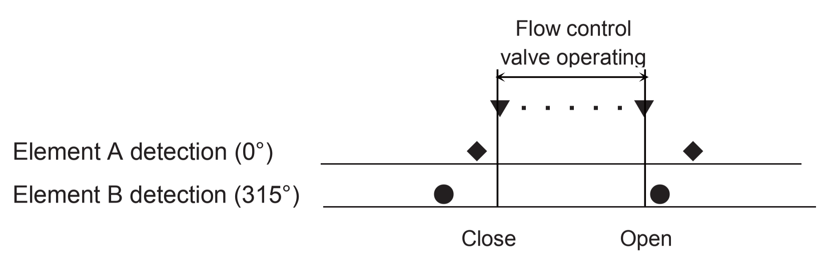
Model inputs

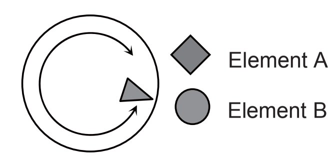
1: ON when ROX-10WB-U is used

2: ON when ROX-20TB2-U is used

3: ON when ROX-20TB2-U with tank is used

Flow control valve mechanism

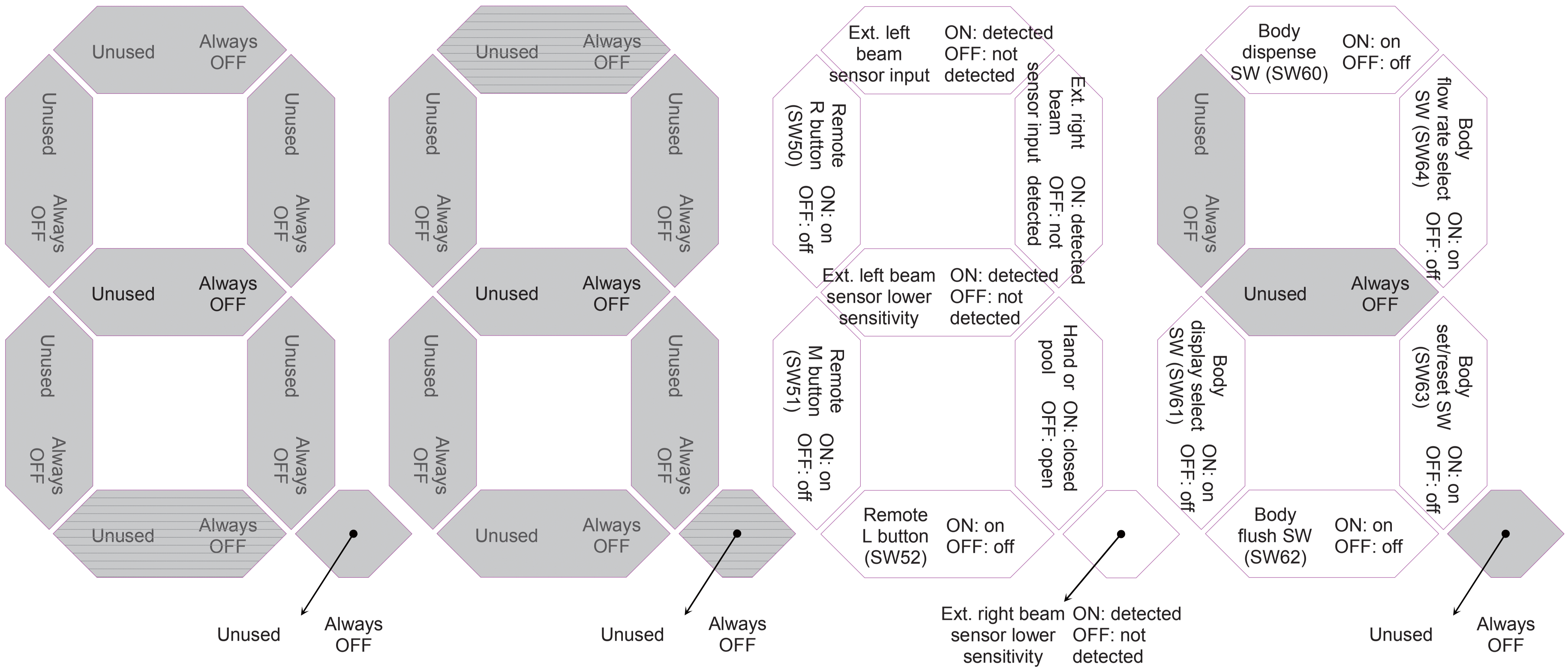




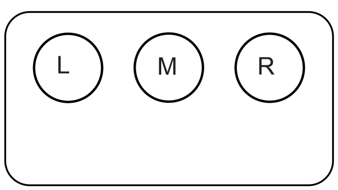
Motor rotation opens/closes valve

◆, ● = hall element detection

C2 Display (ROX-20TB2-U)



Remote panel



Hand or pool

ON when tank is used

(with/without remote controller short circuit connector)

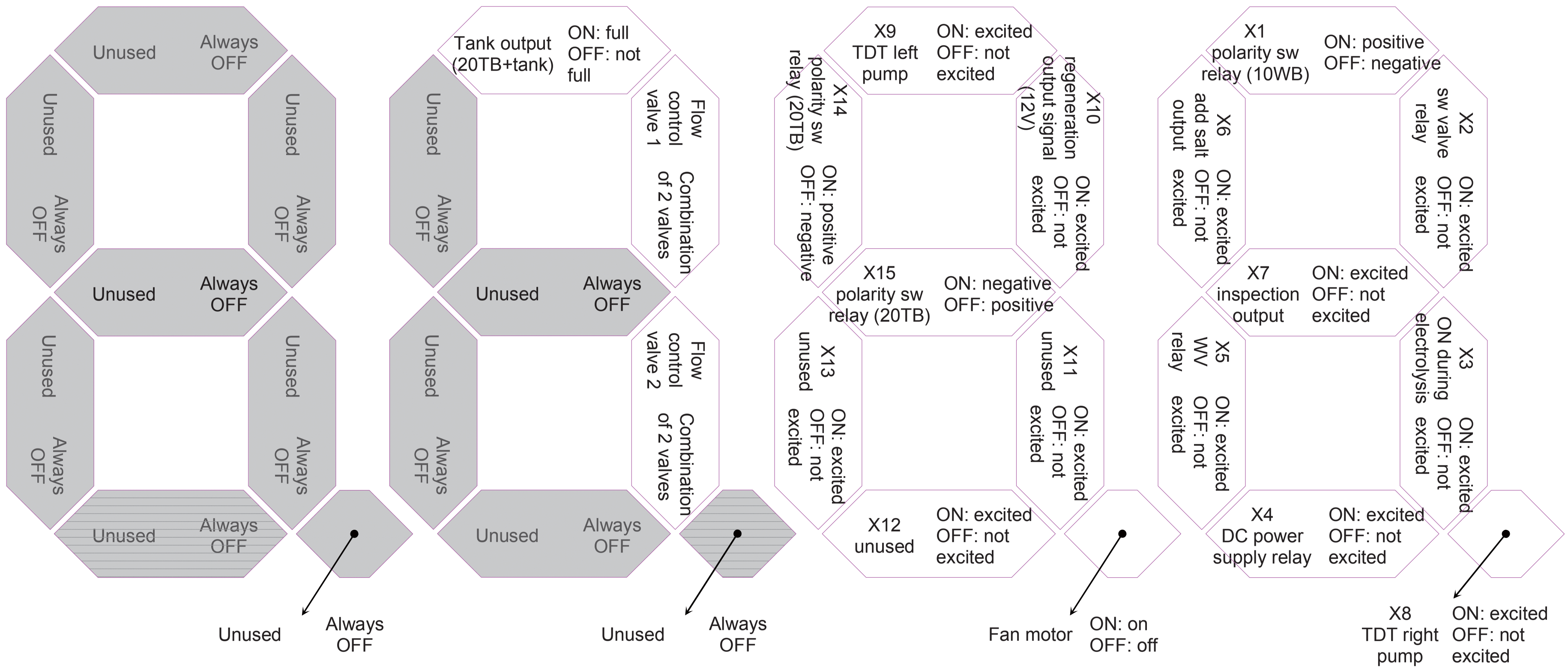
Beam sensor detection

Beam sensor input: real-time display of sensor reaction

Beam sensor lower sensitivity: display according to operation

(0.5 second delay after detection)

C3 Display



Flow control valve outputs

		Brake	Close	Open	Stop
Flow control valve 1	b2	ON	ON	OFF	OFF
Flow control valve 2	C2	ON	OFF	ON	OFF

Brake: valve stopping, Close: decreasing flow rate, Open: increasing flow rate, Stop: valve OFF

III. SERVICE INFORMATION

1. ERROR CODES

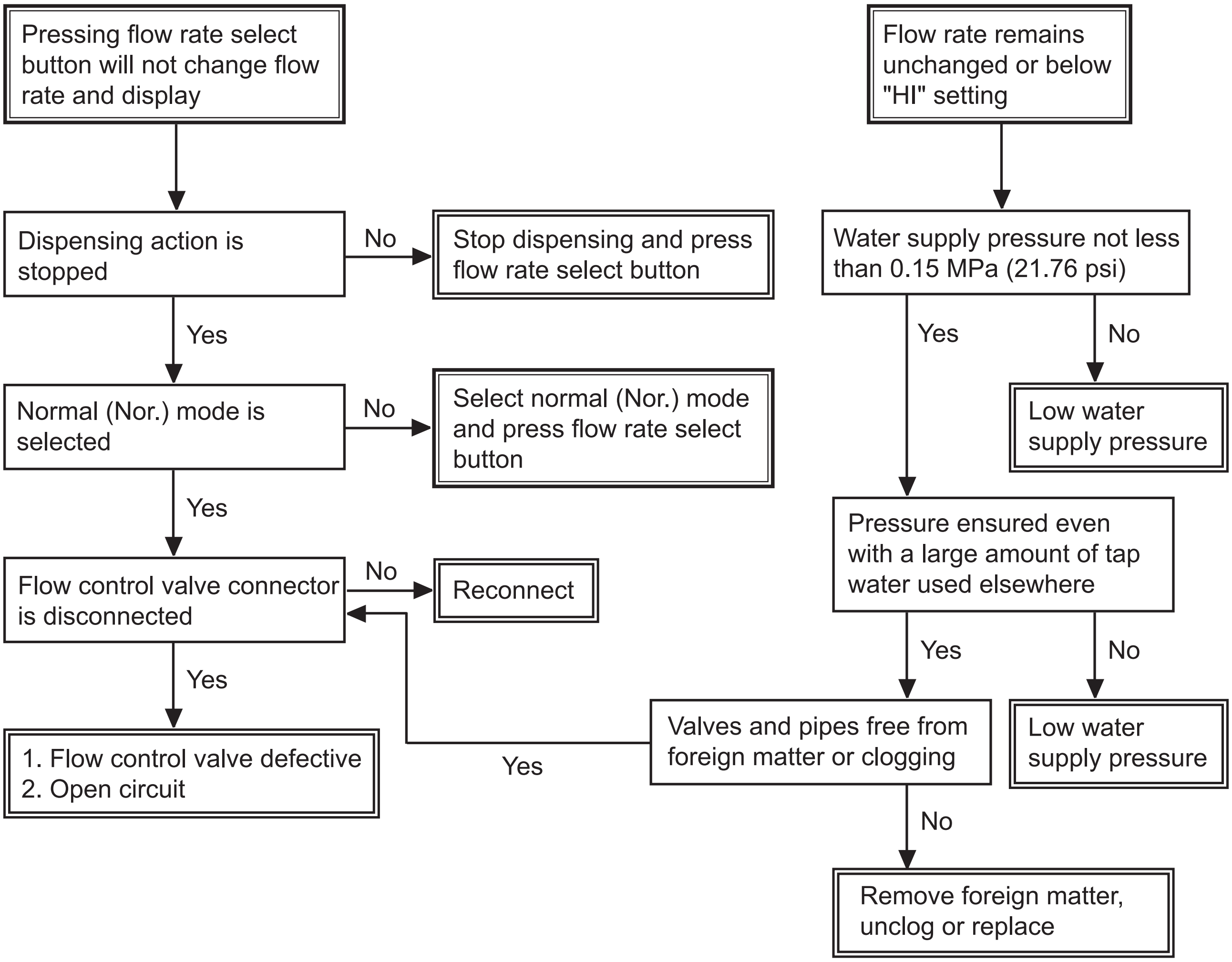
Lamp	No.	Error	Problem	Operation	Control panel display
Error	E11	Low water	Flow rate stayed below 0.13 gal/min (0.5 L/min) for 10 sec with water valve on	Production stops after water valve turns off two times	Error no.
Error	E14	Water shutoff	Flow rate stayed above 0.13 gal/min (0.5 L/min) for 10 sec with water valve off	Production stops after water valve turns on two times	Error no.
Error	E53	Contactor supply	Current stayed below 0.5A for 2 sec	Production stops after contactor switches three times	Error no.
Error	E61	Flow switching valve	Switching did not complete within 30 sec	Production stops	Error no.
—	E74	Thermistor	Open circuit [-22°F (-30°C)] or short circuit [140°F (60°C)]	Production continues as 41°F (5°C) (open circuit) or 86°F (30°C) (short circuit)	Alternate between normal display and error no.
—	E82	Float switch (if provided with tank)	Upper switch on, lower switch off	Production continues (for at least 3 min)	Alternate between normal display and error no.
Add salt water	—	Salt water level	Salt water pump stayed at 700 spm (strokes per minute) for 90 sec	Production stops	(Add salt lamp on)
—	EE1	Model setting	Model setting connector lost or wrong	Production stops	Error no.
Error	EF0	Control board	EEPROM error	Production stops	Error no.

2. SERVICE DIAGNOSIS

Lamp	Error code	Problem	Check	Possible cause	Remedy
Add salt water	—	Salt water pump stayed 700 spm (strokes per minute) for 90 sec	Salt water tank	Low salt water concentration	Add salt in salt water tank
			Salt water hose	Loose connection to salt water tank	Reconnect
				Clogged	Unclog
				Vapor lock	Prime
			Filter	Dirty	Clean
			Switching regulator (electrolytic cell)	Defective	Repair or replace
				DC supply line open circuit	Correct
			Magnetic switch	Defective	Repair or replace
				Bad contacts	Repair
			Relay	Defective	Repair or replace
				Bad contacts	Repair
			Current sensor	Defective	Repair or replace

Lamp	Error code	Problem	Check	Possible cause	Remedy
Add salt water	—	(Continued)	Salt water pump	Defective	Repair or replace
				Improper stroke dial setting	Set to "E" (far to left)
				Supply line open circuit	Correct
				Signal line open circuit	Correct
Error	E11	Flow control valve (flow rate sensor) detected flow rate below 0.13 gal/min (0.5 L/min) for 10 sec with water valve on	Water supply line	Water failure	Recover water supply
			Electrolyzed water outlet	Blocked	Unblock
			Joint hose	Crushed or bent	Correct
				Scaled	Replace
			Filter	Clogged	Unclog
			Water valve	Defective	Repair or replace
				Clogged	Unclog
				Supply line open circuit	Correct
			Flow rate sensor	Defective	Repair or replace
				Clogged	Unclog
				Signal line open circuit	Correct
Error	E14	Flow rate sensor detected flow rate above 0.13 gal/min (0.5 L/min) for 10 sec with water valve off	Water valve	Defective	Repair or replace
				Clogged	Unclog
			Flow rate sensor	Defective	Repair or replace
Error	E53	Electrolytic current stayed below 0.5A for 2 sec	Current sensor	Defective	Repair or replace
				12V DC line open circuit	Correct
				Signal line open circuit	Correct
			Switching regulator	Defective	Repair or replace
			Main control board	Defective	Repair or replace
				Loose chip insertion	Correct
Error	E61	Flow switching did not complete within 30 sec	Gear motor	Defective	Repair or replace
				Overrun	Lubricate motor shaft
			Location microswitch	Defective	Repair or replace
			Direction microswitch	Defective	Repair or replace
—	E74	Thermistor open circuit [-22°F (-30°C)] or short circuit [140°F (60°C)] was detected	Thermistor	Defective	Repair or replace
—	E82	Upper float switch turned on and lower float switch turned off	Float switch	Defective	Repair or replace
—	EE1	Model setting connector lost or wrong	Main control board	Incorrect wiring connector	Correct
—	EF0	EEPROM memory element error	Main control board	Defective	Replace

3. FLOW RATE ADJUSTMENT



Note: The actual flow rate may differ from the setting depending on variation of the flow rate sensor in the flow control valve.
e.g. Total flow rate setting [standard 1.06 gal/min (4.0 L/min)] --> actual flow rate [1.19 gal/min (4.5 L/min)]

If the difference is too large, use the adjustment mode (AdJ.) to adjust the total flow rate (A3).
e.g. Total flow rate setting [0.92 gal/min (3.5 L/min)] --> actual flow rate [1.06 gal/min (4.0 L/min)]

4. REMOVAL AND REPLACEMENT OF COMPONENTS

[a] ELECTROLYTIC CELL

⚠WARNING

To prevent electric shock, be careful not to crush or drag the pipes or wires when removing the electrolytic cell.

NOTICE

To prevent water leaks resulting in wetting the surrounding properties, be sure to drain water before removing the electrolytic cell.

1) Remove the front panel, turn off the power switch (ground fault interrupter), and unplug the unit.
2) Close the water supply line shut-off valve, and disconnect the water supply, cleaning water, and sanitizing water hoses.
3) Unscrew and remove the top and side panels.
4) Remove the drain cap on the back of the unit to drain the electrolytic cell.
5) Disconnect the power cord (red/black) on the electrolytic cell from the terminal block.
6) Remove the four union nuts from the electrolytic cell.
7) Unscrew the cell stopper and frame assembly, and remove the cell stopper from the unit base.
8) Slide out the electrolytic cell towards you.
9) To replace, reverse the above pocedure.